

Infectious Wildlife Diseases and Parasites

This section contains information on some of the more common wildlife diseases and parasites possibly carried by furbearers and nongame mammals that may affect humans. It is provided by either the United States Department of Health and Human Services or the California Department of Health Services. Additional information can be obtained at their respective internet websites: <http://www.hhs.gov/> or <http://www.dhs.ca.gov/>.

Illnesses or diseases that are transmitted to people from vertebrate animals or their habitats are identified as “zoonotic diseases” or “zoonoses.” There are approximately 200 reported zoonotic diseases. Furbearers and nongame mammals can serve as reservoirs for various zoonotic diseases. People can catch zoonoses either directly by contacting the animal, its urine or feces, parasites or vectors, or indirectly by contacting the animal’s habitat (contaminated air, soil, and water). Wildlife can also transmit the infectious agent to domestic animals which would then comprise an additional reservoir for human exposure.

This section focuses on the identification, treatment, prevention, and cleanup to protect against common zoonotic diseases. The following informational fact sheets are intended to educate trappers of the preventative actions that should be undertaken to avoid infection. Some of these diseases can be fatal if due diligence is not exercised in their prevention or treatment. *Your private physician and public health officials should be consulted immediately whenever exposure to a zoonotic disease is suspected.*

Alveolar Echinococcosis **(al-VEE-oh-ler ee-keye-ni-kah-KOH-sis)**

What is Alveolar Echinococcosis (AE)?

AE disease results from being infected with the larval stage of *Echinococcus multilocularis*, a microscopic tapeworm (1-4 millimeters) found in foxes, coyotes, dogs, and cats. Although human cases are rare, infection in humans causes parasitic tumors to form in the liver, and, less commonly, the lungs, brain, and other organs. If left untreated, infection with AE can be fatal.

Where has AE been found?

AE is found worldwide, mostly in northern latitudes. Cases have been reported in central Europe, Russia, China, Central Asia, Japan, and North America. In North America *E. multilocularis* is found primarily in the north central region from eastern Montana to central Ohio, as well as Alaska and Canada. Human cases have been reported in Alaska, the province of Manitoba, and Minnesota. Prevalence among wild foxes and coyotes is high, and may reach over 50% in some areas; however, even in these areas, transmission to humans has been low.

How does infection occur in foxes, coyotes, dogs, and other cats?

Wild foxes, coyotes, and cats get infected when they eat *Echinococcus multilocularis* larvae in infected rodents, field mice, or voles. Cats are less susceptible than dogs, but because they catch and eat rodents often, may also become infected. Once the animal becomes infected, the tapeworm matures in its intestine, produces eggs, and the infected animal passes eggs in the stool. These tapeworm eggs, which are directly infectious to other animals, are too tiny to see, and will stick to anything with which they come in contact. Coyotes, foxes, dogs, and cats are not harmed by the tapeworm and do not have symptoms of AE.

Can animals be tested for *E. multilocularis* tapeworms?

Routine fecal examinations are not sufficient to diagnose *E. multilocularis* infection. Infection with the *E. multilocularis* tapeworm and other tapeworms may occur at the same time. Eggs of *Taenia* species tapeworms and *Echinococcus* tapeworms are similar in shape and size and are very difficult to tell apart. If you live in an area where this parasite occurs or you are concerned about your dog or cat being infected with *E. multilocularis* or other tapeworms, see your veterinarian who can answer your questions and assess the risk of possible infection.

How can I be infected with AE?

By accidentally swallowing the eggs of the *E. multilocularis* tapeworm. Humans can be exposed to these eggs in two main ways, both of which involve "hand-to-mouth" transfer or contamination: By directly ingesting food items contaminated with stool from foxes or coyotes. This might include grass, herbs, greens, or berries gathered from fields. By petting or handling household cats and dogs infected with the *E. multilocularis* tapeworm. These pets may shed the tapeworm eggs in their stool, and their fur may be contaminated. Some dogs "scent roll" in foreign material (such as wild animal feces) and may become contaminated this way.

How likely am I to be infected with AE?

For 50 years, *E. multilocularis* was thought to be confined to the Alaskan coast and Canada. Now, because wild coyotes, foxes, and wolves are being trapped and transported to states where *E. multilocularis* has not previously been found, there is increased risk of spreading the disease to animals and humans. Wild animals carrying the tapeworm could set up the transmission cycle and expose animals not already infected. Many states prohibit this movement of wild animals, but trapping and movement of infected wild canines still occurs. If the transportation and relocation of these animals continues, the risk of human transmission will increase. Although the chances of contracting AE are low, certain groups may be at greater risk. You may be at greater risk if you live in an area where *E. multilocularis* is found (see above). People at high risk include trappers, hunters, veterinarians, or others who contact wild foxes, coyotes, or their stool, or household cats and dogs who have the opportunity to eat wild rodents infected with AE.

What are the symptoms of AE?

AE is caused by tumor-like or cyst-like tapeworm larvae growing in the body. AE usually involves the liver, but can spread to other organs of the body. Because the cysts are slow-growing, infection with AE may not produce any symptoms for many years. Pain or discomfort in the upper abdominal region, weakness, and weight loss may occur as a result of the growing cysts. Symptoms may mimic those of liver cancer and cirrhosis of the liver.

How can I find out if I have AE?

See your health care provider if you think you may have been exposed to AE by one of the ways listed above. He or she can order a blood test for the presence of the parasite or antibodies to *E. multilocularis*.

What is the treatment for AE?

Surgery is the most common form of treatment for AE, although removal of the entire parasite mass is not always possible. After surgery, medication may be necessary to keep the cyst from growing back.

How can I prevent AE?

If you live in an area where *E. multilocularis* is found in rodents and wild canines, take the following precautions to avoid infection: Don't touch a fox, coyote, or other wild canine, dead or alive, unless you are wearing gloves. Hunters and trappers should use plastic gloves to avoid exposure. Don't keep wild animals, especially wild canines, as pets or encourage them to come close to your home. Don't allow your cats and dogs to wander freely or to capture and eat rodents. If you think that your pet may have eaten rodents, consult your veterinarian about the possible need for preventive treatments. After handling pets, always wash your hands with soap and warm water. Fence in gardens to keep out wild animals. Do not collect or eat wild fruits or vegetables picked directly from the ground. All wild-picked foods should be washed carefully or cooked before eating.

BRUCELLOSIS

(UNDULANT FEVER, MEDITERRANEAN FEVER)

What is brucellosis?

Brucellosis is a bacterial infection caused by Brucella bacteria. There are several species of Brucella. Each species is commonly associated with a specific animal host; for example, Brucella abortus with cattle, Brucella melitensis with sheep and goats, Brucella canis with dogs, and Brucella suis with pigs.

How do people become infected with brucellosis?

Currently, consuming unpasteurized dairy products causes most cases of brucellosis. There are occasional infections among laboratory workers handling Brucella cultures. Historically, most human infections were associated with direct contact with infected animals or through mucous membranes or cuts and abrasions in the skin coming in direct contact with animal fluids. Therefore, farmers, veterinarians, and abattoir workers were at highest risk.

How is Brucella maintained in nature?

Brucella is found in domestic and wild animals. It causes a chronic infection that lasts for the life of the animal. The organism is usually found in the reproductive organs and causes abortion and sterility. Animals can release a large number of organisms in their milk, urine, and aborted fetuses, allowing for transmission between animals and to humans.

Who gets brucellosis?

Brucellosis occurs most often in people who have contact with livestock and in people who consume unpasteurized dairy products.

What are the symptoms of brucellosis?

The length of time between exposure and appearance of symptoms of brucellosis is usually one to three weeks, but can be as long as several months. The symptoms of brucellosis are nonspecific. They include fever, sweats, malaise, headache, and back pain. A recurring fever and arthritis is observed if patients go untreated for long periods. Infections that last for more than 12 months can result in infections in bones, joints, liver, kidney, spleen, or heart valves.

How is brucellosis diagnosed?

Since the symptoms of brucellosis are nonspecific, it is often difficult to diagnose. Growing the organism from a blood sample or tissue sample is the best laboratory method for diagnosis. Presence of antibodies in the blood can also indicate whether Brucella might be the cause of infection.

How is brucellosis treated?

It is necessary to treat patients with an appropriate antibiotic for prolonged periods. If therapy is discontinued too early, relapse of symptoms may occur. Best results are obtained when a combination of two or more antibiotics are used.

How can infection with brucellosis be prevented?

Elimination of the disease in domestic animals is the best prevention for brucellosis. Brucellosis control programs are based on vaccination and/or test-and-slaughter of infected animals. These programs have greatly reduced the incidence of animal disease in developed countries, and have resulted in a reduction in the number of human cases. Avoiding consumption of unpasteurized milk and dairy products and limiting exposure to infected domestic animals will prevent most human infections.

Where can I find more information about brucellosis?

The Centers for Disease Control and Prevention has information available at their website http://www.cdc.gov/ncidod/dbmd/diseaseinfo/brucellosis_t.htm.

The World Health Organization also has an informational website at: <http://www.who.int/inf-fs/en/fact173.html>.

EHRlichiosis

What is ehrlichiosis?

Ehrlichiosis (“air-lick-ee-oh-sus”) is a disease of white blood cells caused by very small bacteria called rickettsiae. Two kinds of ehrlichiosis are recognized in humans: human monocytic ehrlichiosis (HME), which infects blood cells called “monocytes”, and human granulocytic ehrlichiosis (HGE), which is an infection of “granulocytes.”

How common is ehrlichiosis?

Ehrlichiosis is far less common in California than in other parts of the country. Of the approximately 1,000 cases identified in the United States (U.S.), fewer than a dozen cases have been in California. Most cases of HME occur in the southcentral U.S., whereas most cases of HGE occur in the upper Midwest and northeastern U.S.

How is ehrlichiosis transmitted?

The bacteria that cause ehrlichiosis are carried by ticks and can be transmitted to a person when a tick bites them. In California, the same tick that carries Lyme disease, the western black-legged tick, can also transmit HGE. Zero to ten percent of western black-legged ticks carry the agent of HGE. It remains uncertain whether this same tick or another species transmits HME in California.

What are the symptoms of ehrlichiosis?

Most individuals infected with the bacteria that cause ehrlichiosis experience no or mild symptoms. When symptoms occur, they resemble influenza, with fever, headache, fatigue, muscle aches, and nausea. Some individuals may also have vomiting, cough, or a rash. More severe illness may occur in some patients, particularly elderly persons or those with weakened immune systems. The disease is rarely fatal.

How is ehrlichiosis treated?

Ehrlichiosis can be successfully treated with antibiotics. Persons with ehrlichiosis generally begin to feel better within one to two days of starting antibiotic treatment.

How do I know if I have ehrlichiosis?

If you experience flu-like symptoms within two to three weeks after receiving a tick bite, or after having been in an area where ticks are prevalent, consult your health care provider. Several different blood tests are available to your physician to help determine whether your illness is ehrlichiosis.

How can I prevent ehrlichiosis?

Taking appropriate precautions to avoid tick bites can reduce the risk of infection with ehrlichiosis, as well as other diseases transmitted by ticks. If possible, avoid areas where ticks are known to occur. When in these areas, wear light-colored long pants and long sleeve shirts. Repellents applied to clothing can further deter ticks from

attaching. When outdoor activities are completed, thoroughly examine yourself and promptly remove any ticks that may be attached.

Where can I find more information on ehrlichiosis?

The Centers for Disease Control and Prevention has information available at their website <http://www.cdc.gov/ncidod/dvrd/ehrlichia/index.htm>.

Giardiasis (GEE-are-DYE-uh-sis)

What is giardiasis?

Giardiasis (GEE-are-DYE-uh-sis) is a diarrheal illness caused by a one-celled, microscopic parasite, *Giardia intestinalis* (also known as *Giardia lamblia*). Once an animal or person has been infected with *Giardia intestinalis*, the parasite lives in the intestine and is passed in the stool. Because the parasite is protected by an outer shell, it can survive outside the body and in the environment for long periods of time. During the past 2 decades, *Giardia* infection has become recognized as one of the most common causes of waterborne disease (found in both drinking and recreational water) in humans in the United States. *Giardia* are found worldwide and within every region of the United States.

How do you get giardiasis and how is it spread?

The *Giardia* parasite lives in the intestine of infected humans or animals. Millions of germs can be released in a bowel movement from an infected human or animal. *Giardia* is found in soil, food, water, or surfaces that have been contaminated with the feces from infected humans or animals. You **can** become infected after accidentally swallowing the parasite; you **cannot** become infected through contact with blood. *Giardia* can be spread by:

- Accidentally putting something into your mouth or swallowing something that has come into contact with feces of a person or animal infected with *Giardia*.
- Swallowing recreational water contaminated with *Giardia*. Recreational water includes water in swimming pools, hot tubs, jacuzzis, fountains, lakes, rivers, springs, ponds, or streams that can be contaminated with sewage or feces from humans or animals.
- Eating uncooked food contaminated with *Giardia*.
- Accidentally swallowing *Giardia* picked up from surfaces (such as bathroom fixtures, changing tables, diaper pails, or toys) contaminated with feces from an infected person.

What are the symptoms of giardiasis?

Giardia infection can cause a variety of intestinal symptoms, which include:

- Diarrhea
- Gas or flatulence
- Greasy stools that tend to float
- Stomach cramps
- Upset stomach or nausea.

These symptoms may lead to weight loss and dehydration. Some people with giardiasis have no symptoms at all.

How long after infection do symptoms appear?

Symptoms of giardiasis normally begin 1 to 2 weeks (average 7 days) after becoming infected.

How long will symptoms last?

In otherwise healthy persons, symptoms of giardiasis may last 2 to 6 weeks. Occasionally, symptoms last longer.

Who is most likely to get giardiasis?

Anyone can get giardiasis. Persons more likely to become infected include:

- Children who attend day care centers, including diaper-aged children
- Child care workers
- Parents of infected children
- International travelers
- People who swallow water from contaminated sources
- Backpackers, hikers, and campers who drink unfiltered, untreated water
- Swimmers who swallow water while swimming in lakes, rivers, ponds, and streams
- People who drink from shallow wells.

Contaminated water includes water that has not been boiled, filtered, or disinfected with chemicals. Several community-wide outbreaks of giardiasis have been linked to drinking municipal water or recreational water contaminated with *Giardia*.

What should I do if I think I may have giardiasis?

See your health care provider.

How is a *Giardia* infection diagnosed?

Your health care provider will likely ask you to submit stool samples to check for the parasite. Because *Giardia* can be difficult to diagnose, your provider may ask you to submit several stool specimens over several days.

What is the treatment for giardiasis?

Several prescription drugs are available to treat *Giardia*. Although *Giardia* can infect all people, young children and pregnant women may be more susceptible to dehydration resulting from diarrhea and should, therefore, drink plenty of fluids while ill.

My child does not have diarrhea, but was recently diagnosed as having giardiasis.**My health care provider says treatment is not necessary. Is this true?**

Treatment is not necessary when the child has no symptoms. However, there are a few exceptions. If your child does not have diarrhea, but is having nausea, fatigue (very tired), weight loss, or a poor appetite, you and your health care provider may wish to consider treatment. If your child attends a day care center where an outbreak is continuing to occur despite efforts to control it, screening and treating children who have no obvious symptoms may be a good idea. The same is true if several family members are ill, or if a family member is pregnant and therefore not able to take the most effective anti- *Giardia* medications.

If I have been diagnosed with giardiasis, should I worry about spreading the infection to others?

Yes, a *Giardia* infection can be very contagious. Follow these guidelines to avoid spreading giardiasis to others: Wash your hands with soap and water after using the toilet, changing diapers, and before eating or preparing food. Do not swim in recreational water (pools, hot tubs, lakes or rivers, the ocean, etc.) if you have *Giardia* and for at least 2 weeks after diarrhea stops. You can pass *Giardia* in your stool and contaminate water for several weeks after your symptoms have ended. This has resulted in outbreaks of *Giardia* among recreational water users. Avoid fecal exposure during sexual activity.

How can I prevent a *Giardia* infection?

Practice good hygiene.

1. Wash hands thoroughly with soap and water.
 - a. Wash hands after using the toilet and before handling or eating food (especially for persons with diarrhea).
 - b. Wash hands after every diaper change, especially if you work with diaper-aged children, even if you are wearing gloves. Protect others by not swimming if you are experiencing diarrhea (essential for children in diapers).

Avoid water that might be contaminated.

1. Do not swallow recreational water.
2. Do not drink untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.
3. Do not drink untreated water during community-wide outbreaks of disease caused by contaminated drinking water.
4. Do not use untreated ice or drinking water when traveling in countries where the water supply might be unsafe.

For information on recreational water-related illnesses, visit CDC's Healthy Swimming website at <http://www.cdc.gov/healthyswimming>.

In the United States, nationally distributed brands of bottled or canned carbonated soft drinks are safe to drink. Commercially packaged non-carbonated soft drinks and fruit juices that do not require refrigeration until after they are opened (those that are stored unrefrigerated on grocery shelves) also are safe. For information on choosing safe bottled water, see the CDC fact sheet entitled "Preventing Cryptosporidiosis: A Guide to Water Filters and Bottled Water," available by visiting http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_crypto_prevent_water.htm.

If you are unable to avoid using or drinking water that might be contaminated, then you can make the water safe to drink by doing one of the following:

- Heat the water to a rolling boil for at least 1 minute. **OR**
- Use a filter that has an absolute pore size of at least 1 micron or one that has been NSF rated for "cyst removal."
- If you cannot heat the water to a rolling boil or use a recommended filter, then try chemically treating the water by chlorination or iodination. Using chemicals may be less effective than boiling or filtering because the amount of chemical required

to make the water safe is highly dependent on the temperature, pH, and cloudiness of the water.

For information on choosing a water filter, see the CDC fact sheet entitled “Preventing Cryptosporidiosis: A Guide to Water Filters and Bottled Water,” available by visiting http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_crypto_prevent_water.htm.

Avoid food that might be contaminated.

1. Wash and/or peel all raw vegetables and fruits before eating.
2. Use safe, uncontaminated water to wash all food that is to be eaten raw.
3. Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.

Avoid fecal exposure during sexual activity.

If my water comes from a well, should I have my well water tested?

It depends. You should consider having your well water tested if you can answer “yes” to any of the following questions:

- **Are members of your family or others who use your well water becoming ill?** If yes, your well may be the source of infection.
- **Is your well located at the bottom of a hill or is it considered shallow?** If so, runoff from rain or flood water may be draining directly into your well causing contamination.
- **Is your well in a rural area where animals graze?** Well water can become contaminated with feces if animal waste seepage contaminates the ground water. This can occur if your well has cracked casings, is poorly constructed, or is too shallow.

Tests used to specifically identify *Giardia* are often expensive, difficult, and usually require hundreds of gallons of water to be pumped through a filter. If you answered “yes” to the above questions, consider generally testing your well for fecal contamination by testing it for the presence of coliforms or *E. coli* instead of *Giardia*. Although tests for fecal coliforms or *E. coli* do not specifically tell you whether *Giardia* is present, these tests will show whether your well water has been contaminated by fecal matter.

These tests are only useful if your well is not routinely disinfected with chlorine, since chlorine kills fecal coliforms and *E. coli*. If the tests are positive, it is possible that the water may also be contaminated with *Giardia* or other harmful bacteria and viruses. Contact your county health department, your county cooperative extension service, or a local laboratory to find out who offers water testing in your area. If the fecal coliform test comes back positive, indicating that your well is fecally contaminated, stop drinking the well water and contact your local water authority for instructions on how to disinfect your well. *This fact sheet is for information only and is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider. If you have any questions about the disease described above or think that you may have a parasitic infection, consult a health care provider.*

HANTAVIRUS PULMONARY SYNDROME

What is hantavirus pulmonary syndrome (HPS)?

HPS is a potentially severe disease of the lungs which was first recognized in 1993 in the "Four Corners" area (where Utah, Colorado, Arizona, and New Mexico meet) of the southwestern United States (U.S.). The disease is caused by hantaviruses, most frequently Sin Nombre virus which causes HPS in the western U.S. Cases of HPS occur throughout the U.S. but are most common in the Southwest. HPS is a rare, but often fatal, disease.

How are hantaviruses maintained in nature?

In the U.S., the hantaviruses that cause HPS are maintained in nature in wild rodents--deer mice in the West, cotton rats and rice rats in the Southeast, and the white-footed mouse in the Northeast. Other rodents, including squirrels, chipmunks, and house mice, are rarely, if ever, infected and do not pose a risk of HPS to humans.

How do you get HPS?

Infected rodents shed hantavirus in their urine, droppings, and saliva. Most patients become infected by breathing air contaminated with rodent urine or droppings, such as when cleaning out a rodent-infested space. Individuals can also be infected by: 1) consuming food contaminated with rodent urine or droppings; 2) touching surfaces where rodents have been, and then putting their hand in their mouth; 3) being bitten by an infected rodent.

What are the signs and symptoms of HPS?

Typically, infected persons develop symptoms one to two weeks after exposure. Early symptoms of HPS include fever, headache, and muscle aches, especially the thighs, hips, back, and shoulders. Other early symptoms include dizziness, chills, nausea, vomiting, diarrhea, and abdominal pain. After two to seven days of these symptoms, patients develop breathing difficulties that range from cough and shortness of breath to severe respiratory failure. Approximately 40 percent of HPS patients die from the disease.

How is HPS diagnosed?

Persons with HPS can be readily diagnosed by specific blood tests.

What treatment is recommended for HPS patients?

Currently, there is no specific treatment for HPS. However, if infected individuals are recognized and hospitalized early, supportive care can increase their chance for survival. Patients with severe respiratory disease can require intensive support of their heart and lung function.

How can I avoid getting HPS?

Avoid contact with all wild rodents, their droppings, and nesting materials. Store all food items securely in rodent-proof containers. Examine the outside of all buildings and block up any holes or other areas that would let rodents get inside. Before entering an enclosed area that may be contaminated with rodent material, allow it to air out for several hours. Surfaces where rodents may have been should be wetted with a dilute bleach solution before mopping up. Do not use a broom or vacuum to clean these areas. Promptly dispose of all cleaning materials when done, and wash hands and clothes.

Where can I find more information about HPS?

The Centers for Disease Control and Prevention has information available at their website <http://www.cdc.gov/ncidod/diseases/hanta/hantvirus.htm>.

Histoplasmosis

What is histoplasmosis?

Histoplasmosis is a disease caused by the fungus *Histoplasma capsulatum*. Its symptoms vary greatly, but the disease primarily affects the lungs. Occasionally, other organs are affected. This form of the disease is called disseminated histoplasmosis, and it can be fatal if untreated.

Can anyone get histoplasmosis?

Yes. Positive histoplasmin skin tests occur in as many as 80% of the people living in areas where *H. capsulatum* is common, such as the eastern and central United States. Infants, young children, and older persons, in particular those with chronic lung disease are at increased risk for severe disease. Disseminated disease is more frequently seen in people with cancer or AIDS.

How is someone infected with *H. capsulatum*?

H. capsulatum grows in soil and material contaminated with bat or bird droppings. Spores become airborne when contaminated soil is disturbed. Breathing the spores causes infection. The disease is not transmitted from an infected person to someone else.

What are the symptoms of histoplasmosis?

Most infected persons have no apparent ill effects. The acute respiratory disease is characterized by respiratory symptoms, a general ill feeling, fever, chest pains, and a dry or nonproductive cough. Distinct patterns may be seen on a chest x-ray. Chronic lung disease resembles tuberculosis and can worsen over months or years. The disseminated form is fatal unless treated.

When do symptoms start?

If symptoms occur, they will start within 3 to 17 days after exposure; the average is 10 days.

Is histoplasmosis treatable?

Yes. Antifungal medications are used to treat severe cases of acute histoplasmosis and all cases of chronic and disseminated disease. Mild disease usually resolves without treatment. Past infection results in partial protection against ill effects if reinfected.

Where is *H. capsulatum* found?

H. capsulatum is found throughout the world and is endemic in certain areas of the United States. The fungus has been found in poultry house litter, caves, areas harboring bats, and in bird roosts.

What can be done to prevent histoplasmosis?

It is not practical to test or decontaminate most sites that may be contaminated with *H. capsulatum*, but the following precautions can be taken to reduce a person's risk of exposure: Avoid areas that may harbor the fungus, e.g., accumulations of bird or bat droppings. Before starting a job or activity having a risk for exposure to *H. capsulatum*, consult the NIOSH/NCID Document Histoplasmosis: Protecting Workers at Risk.

LEPTOSPIROSIS

What is leptospirosis?

Leptospirosis (“lepto”) is an infection caused by bacteria from the genus *Leptospira*. It can infect both humans and animals.

How do people get infected with lepto?

The most common route of infection is through contact of broken skin or the mucous membranes (nose, mouth, eyes) with contaminated water. Water becomes contaminated by the urine of infected domestic or wild animals or people. People who come in contact with urine or tissues of infected animals can also contract the infection.

How is lepto maintained in nature?

Wild and domestic animals are infected with *Leptospira*, and excrete the bacteria in their urine. Some animals can be infected and shed *Leptospira* bacteria for long periods without showing signs of illness.

Who is at greatest risk of becoming infected with lepto?

Farmers, sewer workers, veterinarians, and fish workers can be exposed at work. In infected areas, the disease is a recreational hazard to bathers, campers, hunters, and fishing enthusiasts.

What are the symptoms of lepto infection?

The time between a person’s exposure to the bacteria and becoming sick can range from two days to four weeks. Many people show no signs of infection, others have fever, headache, chills, red eyes, and sore muscles. Severe infections result in anemia, jaundice, liver failure, kidney failure, meningitis, and respiratory distress.

How is lepto infection diagnosed?

Blood or urine tests are used to see if a person is infected.

How is lepto treated?

Leptospirosis is treated with antibiotics, such as doxycycline or penicillin. These should be given early in the disease. Intravenous antibiotics may be needed for persons with more severe symptoms.

How can infection be prevented?

The chances of getting leptospirosis can be greatly reduced by avoiding swimming or wading in water that might be contaminated with animal urine. People whose job or recreational activities exposes them to contaminated water or soil should wear protective clothing or footwear. Because rodents are common carriers of *Leptospira*, proper control of rodents around homes and buildings is important. Keep your dogs’

vaccination against leptospirosis current to reduce the potential for your dog to become infected and pass the infection to you.

Where can I get more information about leptospirosis?

The Centers for Disease Control and Prevention has information available at their website http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis_g.htm.

Another good website is: <http://www.astdhpphe.org/infect/lepto.html>.

LYME DISEASE

What is Lyme disease?

Lyme disease is an infectious disease caused by a bacterium known as a spirochete. People get Lyme disease when a tick infected with the Lyme disease bacterium attaches and feeds on them. Lyme disease was first recognized in the northeastern United States in the 1970s. Lyme disease has been reported from many areas of the country, including California.

What are the symptoms of Lyme disease?

Lyme disease can affect many body systems. Symptoms can vary and diagnosis can be difficult. Lyme disease can start as a mild flu-like illness and, over time, develop into severe chronic health problems. The early stages of the disease can include a red, expanding skin rash (called erythema migrans or EM), chills and fever, headache, swollen lymph nodes, muscle and joint pain, weakness of some muscles in the face, and heart irregularities. The EM rash appears up to 30 days after the bite of an infected tick. One or more EM rashes can occur, not necessarily at the tick bite. The rash can precede, accompany, or follow flu-like symptoms. The rash may not be noticed in some instances due to skin tone or occurrence on the body in locations difficult to see. Occasionally, an allergic reaction to the tick bite can occur on the skin and may be mistaken for an EM. The allergic reaction is different from an EM rash because it happens within minutes to hours after the tick bite and does not spread.

If left untreated, arthritis or nervous system signs can develop in some Lyme disease patients. Arthritis is most likely to appear as bouts of pain and swelling, usually in one or more large joints, especially the knees. Nervous system abnormalities can include numbness, tingling, or pain in the arms and legs, or difficulties in memory and the ability to concentrate.

Lyme disease can be successfully treated with antibiotics, especially in the early stages. The potential for long-term complications increases if the disease progresses untreated.

How does one get Lyme disease?

The western blacklegged tick, *Ixodes pacificus*, transmits the bacteria that cause Lyme disease to humans in California. The tick has three life stages: larva, nymph, and adult. The larvae and nymphs feed on the blood of small rodents, rabbits, lizards, birds, and occasionally large mammals. Adults feed on the blood of large mammals, principally deer.

Both nymphs and adults of the western blacklegged tick can transmit the infection to humans. Nymphs likely play a greater role in transmission of Lyme disease to humans because they are small (<1mm or about the size of a poppy seed) and thus difficult to see. Also, in some areas, a higher percentage of nymphal ticks carry the Lyme disease

organism than adult ticks. An infected tick must be attached and feeding for at least a day before it can transmit the spirochetes.

Where is the risk of getting Lyme disease greatest in California?

The western black-legged tick has been found in 55 of the 58 counties in California. It is abundant in the humid coastal areas and on the western slope of the Sierra Nevada range. Ticks prefer cool, moist environments and can be found on wild grasses and low vegetation in both urban and rural areas. Adult ticks climb to the tip of vegetation along animal trails and wait for a host to brush against them. Nymphs are found in low, moist vegetation such as leaf litter. Adults are most active from November through March and the nymphs are active primarily from March through August.

What can be done to keep from getting Lyme disease?

- Avoid areas where ticks are known to occur.
- Stay in the middle of the trail; avoid trail margins, brush, and grassy areas.
- Tuck pants into boots or socks, and shirt into pants.
- Wear light-colored clothing and long-sleeved shirts so ticks can be more easily seen.
- Apply insect repellents labeled for ticks to clothing.
- Thoroughly check yourself and others for ticks during and after activities in tick-infested areas.
- Keep grass along trails, buildings, and camping areas mown.

How should attached ticks be removed?

- Using tweezers, grasp the tick's mouthparts as close to the skin as possible.
- Gently pull the tick straight out, using a firm steady motion.
- Wash your hands and the bite site with soap and water. Apply an antiseptic to the bite site.
- Note: Prompt tick removal can prevent transmission of infection.
- Consult with your physician if you develop any symptoms, especially a rash, within 30 days of the tick bite.

Where can I get more information on Lyme disease?

The Centers for Disease Control and Prevention has information available at their website http://www.cdc.gov/ncidod/diseases/submenus/sub_lyme.htm.

PLAGUE

What is plague?

Plague is an infectious disease caused by the bacteria *Yersinia pestis*. Historically, plague caused thousands of deaths throughout Europe during the 6th and 14th Centuries. Today, plague in humans is rare in the United States and can be treated effectively with antibiotics if diagnosed early.

Is plague present in California?

Yes. Rodents and their fleas maintain plague in nature. In California, the primary rodents involved are wild squirrels and chipmunks. Transmission of plague from urban rodents (rats) to humans has not been seen in California since the 1920s. The major threat of plague is from wild rodents in rural recreational and wilderness parts of the State. Rodents in the suburban foothills of some larger cities pose a threat. Plague is most common in the foothills, plateaus, mountains, and coast. It is absent from the southeastern desert region and the San Joaquin Valley.

How is plague transmitted?

Plague is transmitted to people most commonly through the bite of an infected flea. Infection is also possible when the blood or other body fluids of an infected animal enter through cuts or breaks in the skin or mucous membranes. Finally, plague can be contracted by inhaling bacteria from the cough or sneeze of an infected person or animal, especially cats. Cats are especially susceptible to plague and represent a serious source of potential human exposure. Cats may also transport infected rodent fleas into a home or campsite.

What are the symptoms of plague?

The initial symptoms of plague usually develop two to six days after exposure and include nausea, vomiting, fever, chills, muscle aches, headache, and weakness. Three forms of plague are known: bubonic, septicemic, and pneumonic. Bubonic plague, the most common form, is characterized by swollen and tender lymph nodes (called "buboes") in the groin, neck, or armpit. In septicemic plague, plague bacteria infect the bloodstream, causing high fever, fatigue, weakness, and bleeding disorders. Pneumonic plague can follow bubonic or septicemic plague, or occur directly from inhalation of infectious bacteria. Patients with pneumonic plague have difficulty breathing, develop a cough, and may spit up blood-tinged saliva.

How is plague diagnosed?

Diagnosis is based on finding the bacteria in blood, saliva or mucus from the throat, or material from enlarged lymph nodes. Blood tests are also available.

Is plague treatable?

A patient who possibly has plague should be hospitalized and placed in isolation. Antibiotic treatment should begin as soon as possible. Most bubonic plague patients recover following antibiotic treatment. Septicemic and pneumonic plague are often fatal if antibiotic treatment is not started within the first 24 hours of illness. Persons who have been in close contact with a patient who has plague pneumonia should be identified and evaluated by a physician.

How can I decrease my chances of getting plague?

Be aware of areas in which plague-infected rodents might exist. Follow the instructions on notices regarding plague that are posted at camping and recreation areas. Avoid all contact with rodents and their fleas, especially sick or dead rodents. Store food and garbage in rodent-proof containers. Do not feed rodents in campgrounds and picnic areas. Do not place chairs, tents, or sleeping bags near rodent burrows. Wear long pants tucked into boots and use insect repellent to avoid flea exposure. Do not allow pets to approach sick or dead rodents, or to explore rodent burrows. Be cautious when handling ill cats which have potential contact with wild rodents; take them to your veterinarian for examination. If you become ill within seven days after being in a plague area, contact a physician immediately.

Where can I find more information on plague?

The Centers for Disease Control and Prevention has information available at their website <http://www.cdc.gov/health/plague.htm>.

RABIES

What is rabies?

Rabies is a viral disease that affects the central nervous system. The virus is usually passed to humans via the bite of a rabid animal. Occasionally rabies can be transmitted if the saliva of an infected animal gets into a fresh scratch, break in the skin, or contact with mucous membranes (eyes, mouth, nose).

Who gets rabies?

Human rabies is rare in the United States (U.S.). The latest human rabies case in California occurred in April 2002. Currently in the U. S., the majority of human cases are caused by rabid bats. Any mammal can contract rabies. In California, most cases of rabies occur in skunks and bats. Domestic animals account for three percent of animal rabies, and the rest occurs in a variety of wild animals, including foxes. Independent transmission cycles in skunks and bats maintain the virus in nature in California.

What are the symptoms of rabies in humans?

In humans, symptoms of rabies appear an average of three to eight weeks after exposure to the virus. Symptoms may appear as soon as nine days and as long as a year or more after a bite or other exposure. Early signs in humans are nonspecific and include fever, headache, and general malaise. As the disease progresses, neurological symptoms appear, including insomnia, anxiety, confusion, partial paralysis, excitation, hallucination, hypersalivation, and difficulty swallowing due to paralysis of throat muscles. Death usually occurs within days of the onset of symptoms.

How can I tell if an animal has rabies?

Symptoms in animals vary with the species and stage of the disease, but abnormal behavior is the most obvious sign to people. Special signs to watch for include:

- Wild animals that seem unusually tame or unafraid, and approach people in an uncharacteristic manner.
- Nocturnal animals such as skunks, foxes or bats, that are active during daylight.
- Pets that have difficulty walking, eating, or drinking. Or pets whose personalities change, or whose voice tone changes.
- Signs of excitement or viciousness in normally quiet animals.
- Bats that are unable to fly or have been caught by a domestic dog or cat.
- Cattle that "strain" for a long period of time or "bellow" (vocalize) excessively.

The sick animal may go through one or more stages: 1) "furious" stage (viciousness, vocalization, snapping, drooling, chewing on fences, or swallowing strange objects such as stones); 2) "dumb" or "paralytic" stage (difficulty swallowing, drinking or walking, choking or flaccid paralysis); and 3) a combination of both stages. Finally the whole body becomes paralyzed and the animal dies.

If an animal displays suspicious behavior, avoid contact with it. Notify your local animal control agency immediately.

What control measures are in place to prevent rabies?

The California Rabies Prevention and Control Program requires vaccination and licensing of dogs. The program works to control stray domestic animals. Trained professionals follow up on potential human exposures. Because cats are the most frequently reported rabid domestic animal in the U.S., vaccination of all cats is also strongly advised. There are vaccines for other domestic animals as well. The program also keeps track of animal rabies throughout the State.

What can I do if I think I have been exposed to rabies?

If you are bitten or scratched by a rabid or possibly rabid animal, wash the wound thoroughly with soap and warm water and immediately consult a physician. The physician will decide if anti-rabies treatment is necessary. If so, the treatment should be started as soon as possible. Veterinarians and their staff, animal control workers, and wildlife rehabilitators are at high risk and should be vaccinated as a preventive measure against rabies. Local health departments can be consulted to help evaluate the need for rabies immunization.

What if a wild animal bites my pet?

If a wild animal bites your pet, use gloves to prevent contacting the wild animal's saliva. Contact your veterinarian and local animal control officer as soon as possible. Any animal bitten by a wild animal that is not available for testing is considered as having been exposed to rabies. Unvaccinated dogs and cats exposed to a rabid animal should be euthanized immediately. If you are unwilling to do this, the animal must be immediately vaccinated and put in strict isolation for six months. Dogs and cats with rabies vaccination need immediate re-vaccination and then strictly isolated for 30 days.

What if my pet bites someone?

Immediately notify the local health officer or designee. The law requires that the local health officer be contacted when any person or animal is bitten by, or potentially exposed to, a rabid or suspected rabid animal. In addition, the local health officer must be notified when an animal bites any person. People possibly exposed to rabies are evaluated and the decision is made whether or not anti-rabies treatment is necessary. Domestic dogs or cats that bite humans must be placed in strict confinement. (The local health officer defines strict confinement.) The animal is observed daily for ten days following the bite for signs of rabies, regardless of the animal's vaccination status. Alternatively, biting animals may be immediately euthanized and tested for rabies at an approved public health laboratory. If the isolated dog or cat is healthy after ten days, there is no risk of a rabies exposure from the original bite wound.

What can I do to help prevent the spread of rabies?

Be a responsible pet owner. Keep rabies vaccinations up-to-date for all cats and dogs. Take your pet to your veterinarian on a regular basis. Maintain control of your pets by

keeping them under direct supervision. Spay or neuter your pets to help reduce the number of unwanted pets that may not be properly cared for or vaccinated regularly. Lastly, call animal control to remove all stray animals from your neighborhood since these animals may be unvaccinated or ill.

Avoid contact with unfamiliar animals. Enjoy wild animals from a distance. Do not handle, feed, or attract wild animals. Place litter in closed garbage cans. Never adopt or bring wild animals into your home. Teach your children to never handle unfamiliar animals, wild or domestic, even if they appear friendly. Prevent bats from entering areas where they might come in contact with people or pets. When travelling abroad, take extra care to avoid animals, especially dogs in developing countries, where rabies is common.

Where can I get more information regarding rabies?

The California Compendium of Rabies Control and Prevention is available on the Department of Health Services' website, under the Veterinary Public Health Section <http://www.dhs.ca.gov/ps/dcdc/disb/disbindex.htm>.

The Centers for Disease Control and Prevention also has a useful website: <http://www.cdc.gov/ncidod/dvrd/rabies>.

ROCKY MOUNTAIN SPOTTED FEVER

What is Rocky Mountain spotted fever (RMSF)?

RMSF is a bacterial disease caused by a bacterium, *Rickettsia rickettsii*. Contrary to its name, most cases of RMSF occur in the southeastern and south-central United States. Cases occur most frequently between April and September. In California, only a few cases are reported each year.

How do you get RMSF?

RMSF bacteria are transmitted by the bite of an infected tick. A tick must be attached to the skin for at least four to six hours before it can infect a person. Infection can also occur if crushed tissues or feces of the tick contaminate breaks in the skin or mucous membranes. The tick that most commonly transmits the RMSF bacteria in California is the Pacific Coast tick, *Dermacentor occidentalis*. The Rocky Mountain wood tick, *Dermacentor andersoni* may also transmit the bacteria in California.

How is RMSF maintained in nature?

Ticks become infected when they feed on infected rodents or rabbits. Although dogs may acquire RMSF, they do not transmit RMSF; however, they may bring infected ticks into the human environment.

What are the symptoms of RMSF?

RMSF is characterized by sudden onset of moderate to high fever 2-14 days after a tick bite. Without treatment, the fever can persist for two to three weeks and lead to other symptoms, such as weakness, deep muscle pain, severe headache, chills, blood-shot eyes, and a painful abdomen. In at least half of the reported cases in California, a rash appears that rapidly spreads to much of the body, including the palms of the hands and soles of the feet. Severe cases can result in kidney failure and death.

How is RMSF diagnosed?

Early diagnosis of RMSF relies on symptoms and history or suspicion of a tick bite. Blood tests are not useful within the first week of illness. During the early stages of the disease, the bacteria may also be seen microscopically in skin or in blood. Blood tests later in the illness can show the body's immune response to infection with the RMSF bacteria.

What treatment is recommended for RMSF patients?

RMSF patients are treated with antibiotics. Up to 25 percent of patients who receive delayed or no treatment may die.

Where can I find more information on RMSF?

The Centers for Disease Control and Prevention has information available at their website <http://www.cdc.gov/ncidod/dvrd/rmsf/index.htm>.

ROUNDWORMS

(LARVA MIGRANS)

What are roundworms?

Roundworms are intestinal parasites. They are common in a number of different animal species, including dogs and cats. Each animal has a roundworm that is specific to that species. There is a roundworm specific to humans, but this parasite is rarely found in developed countries. Humans can become infected with animal roundworms by accidentally ingesting eggs or larvae. Having direct skin contact with larvae of certain types of roundworms may also cause an infection.

How are roundworms maintained in nature?

Puppies and kittens are often infected with roundworm larvae from their mother. This can happen before birth (puppies) or from the mother's milk (puppies and kittens). The larvae travel into the lungs, are coughed up, and swallowed. Larvae also get into the intestine after hatching out of ingested eggs. Larvae then mature into adult worms and begin to lay eggs, which are excreted in feces. The eggs contaminate the environment. Puppies can be infected with several hundred worms. Because each worm can produce thousands of eggs per day, the environment can be contaminated with millions of eggs over a short period of time. The eggs can survive for months or even years in the environment. Some wild animals are also infected with roundworms that can infect humans. A roundworm of raccoons can cause a very severe disease in humans. Extra care must be taken when pets, raccoons, and other wild animals are in your area.

What happens when you become infected with roundworms?

When humans become infected, usually from accidentally or unknowingly ingesting eggs, the eggs hatch and larval worms usually travel (migrate) within the persons' tissues. This is called larva migrans. The larvae may travel through the liver, lungs, other organs, and tissues, causing damage. Small children are especially at risk because they may put egg-contaminated objects or dirt into their mouths.

What are the symptoms of roundworm infection?

In most cases, signs are mild to non-existent. In children the disease can be more severe, with fever, coughing, nausea, vomiting, and sore muscles. Sometimes infections occur in the eye or brain. Hookworms, a type of roundworm, may cause a severely itchy skin condition.

How are roundworm infections treated?

Anti-parasitic drugs, often in combination with anti-inflammatory medications, are usually successful in treating roundworm infections. Eye and brain infections are more difficult to treat, and treated persons may not fully recover.

How can I prevent infection with roundworms?

There are a number of steps that can be taken to prevent infection of you and your children:

- Periodic deworming of dogs and cats. Consult with your veterinarian for a recommended schedule for your area. It is especially important to treat puppies and kittens because they are most susceptible to infection.
- Wash your hands well with soap and water after playing with your pets and after outdoor activities, especially before you eat. Teach children to always wash their hands after playing with dogs and cats and after playing outdoors.
- Do not allow children to play in areas that are soiled with pet or other animal stool.
- Clean your pet's living area at least once a week. Feces should be either buried or bagged and disposed of in the trash.
- Teach children that it is dangerous to eat dirt or soil.
- Take extreme care when disposing of raccoon feces. Wear a mask or respirator with a HEPA filter, dampen the area being cleaned, wear disposable gloves, double bag and dispose of contaminated materials. Contaminated clothes should either be discarded in double bags, or washed in near boiling water with bleach added.

Where can I find more information about roundworms?

The Centers for Disease Control and Prevention has information available at their website http://www.cdc.gov/ncidod/dpd/parasites/toxocara/factsht_toxocara.htm.

SALMONELLOSIS

What is salmonellosis?

Salmonellosis is an infection with a bacteria called Salmonella. Most persons infected with Salmonella develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. The illness usually lasts 4 to 7 days, and most persons recover without treatment. However, in some persons the diarrhea may be so severe that the patient needs to be hospitalized. In these patients, the Salmonella infection may spread from the intestines to the blood stream, and then to other body sites and can cause death unless the person is treated promptly with antibiotics. The elderly, infants, and those with impaired immune systems are more likely to have a severe illness.

What sort of germ is Salmonella?

The Salmonella germ is actually a group of bacteria that can cause diarrheal illness in humans. They are microscopic living creatures that pass from the feces of people or animals, to other people or other animals. There are many different kinds of Salmonella bacteria. Salmonella serotype Typhimurium and Salmonella serotype Enteritidis are the most common in the United States. Salmonella has been known to cause illness for over 100 years. They were discovered by a American scientist named Salmon, for whom they are named.

How can Salmonella infections be diagnosed?

Many different kinds of illnesses can cause diarrhea, fever, or abdominal cramps. Determining that Salmonella is the cause of the illness depends on laboratory tests that identify Salmonella in the stools of an infected person. These tests are sometimes not performed unless the laboratory is instructed specifically to look for the organism. Once Salmonella has been identified, further testing can determine its specific type, and which antibiotics could be used to treat it.

How can Salmonella infections be treated?

Salmonella infections usually resolve in 5-7 days and often do not require treatment unless the patient becomes severely dehydrated or the infection spreads from the intestines. Persons with severe diarrhea may require rehydration, often with intravenous fluids. Antibiotics are not usually necessary unless the infection spreads from the intestines, then it can be treated with ampicillin, gentamicin, trimethoprim/sulfamethoxazole, or ciprofloxacin. Unfortunately, some Salmonella bacteria have become resistant to antibiotics, largely as a result of the use of antibiotics to promote the growth of feed animals.

Are there long term consequences to a Salmonella infection?

Persons with diarrhea usually recover completely, although it may be several months before their bowel habits are entirely normal. A small number of persons who are infected with Salmonella, will go on to develop pains in their joints, irritation of the eyes, and painful urination. This is called Reiter's syndrome. It can last for months or years, and can lead to chronic arthritis which is difficult to treat. Antibiotic treatment does not make a difference in whether or not the person later develops arthritis.

How do people catch Salmonella?

Salmonella live in the intestinal tracts of humans and other animals, including birds. Salmonella are usually transmitted to humans by eating foods contaminated with animal feces. Contaminated foods usually look and smell normal. Contaminated foods are often of animal origin, such as beef, poultry, milk, or eggs, but all foods, including vegetables may become contaminated. Many raw foods of animal origin are frequently contaminated, but fortunately, thorough cooking kills Salmonella. Food may also become contaminated by the unwashed hands of an infected food handler, who forgot to wash his or her hands with soap after using the bathroom.

Salmonella may also be found in the feces of some pets, especially those with diarrhea, and people can become infected if they do not wash their hands after contact with these feces. Reptiles are particularly likely to harbor Salmonella and people should always wash their hands immediately after handling a reptile, even if the reptile is healthy. Adults should also be careful that children wash their hands after handling a reptile.

What can a person do to prevent this illness?

There is no vaccine to prevent salmonellosis. Since foods of animal origin may be contaminated with Salmonella, people should not eat raw or undercooked eggs, poultry, or meat. Raw eggs may be unrecognized in some foods such as homemade hollandaise sauce, caesar and other homemade salad dressings, tiramisu, homemade ice cream, homemade mayonnaise, cookie dough, and frostings. Poultry and meat, including hamburgers, should be well-cooked, not pink in the middle. Persons also should not consume raw or unpasteurized milk or other dairy products. Produce should be thoroughly washed before consuming.

Cross-contamination of foods should be avoided. Uncooked meats should be kept separate from produce, cooked foods, and ready-to-eat foods. Hands, cutting boards, counters, knives, and other utensils should be washed thoroughly after handling uncooked foods. Hands should be washed before handling any food, and between handling different food items.

People who have salmonellosis should not prepare food or pour water for others until they have been shown to no longer be carrying the Salmonella bacterium.

People should wash their hands after contact with animal feces. Since reptiles are particularly likely to have Salmonella, everyone should immediately wash their hands after handling reptiles. Reptiles (including turtles) are not appropriate pets for small children and should not be in the same house as an infant.

How common is salmonellosis?

Every year, approximately 40,000 cases of salmonellosis are reported in the United States. Because many milder cases are not diagnosed or reported, the actual number of infections may be thirty or more times greater. Salmonellosis is more common in the summer than winter.

Children are the most likely to get salmonellosis. Young children, the elderly, and the immunocompromised are the most likely to have severe infections. It is estimated that approximately 600 persons die each year with acute salmonellosis.

What else can be done to prevent salmonellosis?

It is important for the public health department to know about cases of salmonellosis. It is important for clinical laboratories to send isolates of *Salmonella* to the City, County, or State Public Health Laboratories so the specific type can be determined and compared with other *Salmonella* in the community. If many cases occur at the same time, it may mean that a restaurant, food or water supply has a problem which needs correction by the public health department.

Some prevention steps occur everyday without you thinking about it. Pasteurization of milk and treating municipal water supplies are highly effective prevention measures that have been in place for many years. In the 1970s, small pet turtles were a common source of salmonellosis in the United States, and in 1975, the sale of small turtles was halted in this country. Improvements in farm animal hygiene, in slaughter plant practices, and in vegetable and fruit harvesting and packing operations may help prevent salmonellosis caused by contaminated foods. Better education of food industry workers in basic food safety and restaurant inspection procedures, may prevent cross-contamination and other food handling errors that can lead to outbreaks. Wider use of pasteurized egg in restaurants, hospitals, and nursing homes is an important prevention measure. In the future, irradiation or other treatments may greatly reduce contamination of raw meat.

What is the government doing about salmonellosis?

The Centers for Disease Control and Prevention (CDC) monitors the frequency of *Salmonella* infections in the country and assists the local and State Health Departments to investigate outbreaks and devise control measures. CDC also conducts research to better identify specific types of *Salmonella*. The Food and Drug Administration inspects imported foods, milk pasteurization plants, promotes better food preparation techniques in restaurants and food processing plants, and regulates the sale of turtles. The FDA also regulates the use of specific antibiotics as growth promotants in food animals. The US Department of Agriculture monitors the health of food animals, inspects egg pasteurization plants, and is responsible for the quality of slaughtered and processed meat. The US Environmental Protection Agency regulates and monitors the safety of our drinking water supplies.

How can I learn more about this and other public health problems?

You can discuss any medical concerns you may have with your doctor or other health care provider. Your local City or County Health Department can provide more information about this and other public health problems that are occurring in your area. General information about the public health of the nation is published every week in the "Morbidity and Mortality Weekly Report", by the CDC in Atlanta, GA. Epidemiologists in your local and State Health Departments are tracking a number of important public health problems, investigating special problems that arise, and helping to prevent them from occurring in the first place, or from spreading if they do occur.

What can I do to prevent salmonellosis?

Cook poultry, ground beef, and eggs thoroughly before eating. Do not eat or drink foods containing raw eggs, or raw unpasteurized milk. If you are served undercooked meat, poultry or eggs in a restaurant, don't hesitate to send it back to the kitchen for further cooking. Wash hands, kitchen work surfaces, and utensils with soap and water immediately after they have been in contact with raw meat or poultry. Be particularly careful with foods prepared for infants, the elderly, and the immunocompromised. Wash hands with soap after handling reptiles or birds, or after contact with pet feces. Avoid direct or even indirect contact between reptiles (turtles, iguanas, other lizards, snakes) and infants or immunocompromised persons. Don't work with raw poultry or meat, and an infant (e.g., feed, change diaper) at the same time. Mother's milk is the safest food for young infants. Breast-feeding prevents salmonellosis and many other health problems.

TULAREMIA

(RABBIT FEVER, DEER-FLY FEVER)

What is tularemia?

Tularemia is an infectious bacterial disease. Tularemia is usually a disease of wild animals, but severe illness and death may also occur in humans.

How is tularemia spread?

The bacterium that causes tularemia is common in various kinds of ticks and in small and medium-sized mammals, especially rabbits, hares, beavers, muskrats, and voles. In the United States, there are two main sources of infection for humans: 1) bites by ticks or biting flies, and 2) contact with infected animals or their carcasses, especially the cottontail rabbit. People may also become infected from eating improperly cooked rabbit or hare meat or from contact with contaminated water, dust, hay, mud, or animal bites. The disease is not spread from human-to-human.

Who gets tularemia?

Hunters, trappers, wildlife specialists, and others who handle or eat infected animals are most likely to become infected. Persons exposed to bites of certain ticks and some species of biting flies are also at some risk of becoming infected. Tularemia can occur at any age.

What are the symptoms of tularemia?

Symptoms of tularemia in humans appear about three to five days after infection. They may include chills, fever, headache, generalized body ache, cough, and chest pain or tightness. The bacteria multiply in the skin at the bite or wound site, usually causing an ulcer to form. From this site, bacteria spread to lymph nodes and may spread further if bacterial growth has not slowed. Without treatment, symptoms usually last for several weeks. Occasionally, tularemia will spread to other sites in the body, resulting in pneumonia, sepsis (blood infection), or meningitis.

How is tularemia diagnosed?

Tularemia is diagnosed by a blood test for antibodies to the bacterium. Tularemia can also be identified by growing the bacteria under special conditions in a laboratory.

What is the treatment for tularemia?

Antibiotics are used to treat people with tularemia.

How can tularemia be prevented?

To prevent infections, avoid exposure to bites by ticks and blood-feeding flies and avoid direct contact with wild animal tissues. When you enter areas infested with biting flies and ticks, wear protective clothing, tuck pants into socks, and apply insect repellants as directed by the manufacturer. Examine clothing and skin frequently for ticks. Remove

attached ticks promptly. Hunters and trappers need to wear gloves, masks, and protective eye covers when handling animal carcasses. Animals that appear ill should not be skinned or dressed. Teach children to not handle any sick or dead animals.

Where can I get more information about tularemia?

Websites with good information about tularemia are:

http://www.cdc.gov/ncidod/diseases/submenus/sub_tularemia.htm

<http://www.ci.nyc.ny.us/html/doh/html/cd/cdtul.html>

<http://hlunix.hl.state.ut.us/els/epidemiology/epifacts/tularem.html>